Pit Quarry

SAND · GRAVEL · STONE

HANDLING · CRUSHING · SCREENING · WASHING

APR 17 1919 III: 4

For Quality and Price—

AJAX CONVEYOR BELTING

Will Meet Your Requirements

Wear-Resisting Qualities and Reasonable Price are combined in AJAX Belting. It places 50 years of belt-making experience at your service.

***You Can Depend on* AJAX**

The Gutta Percha & Rubber Mfg. Co.

CHICAGO, 303 W. Randolph St. NEW YORK PHILADELPHIA

JANUARY, 1919

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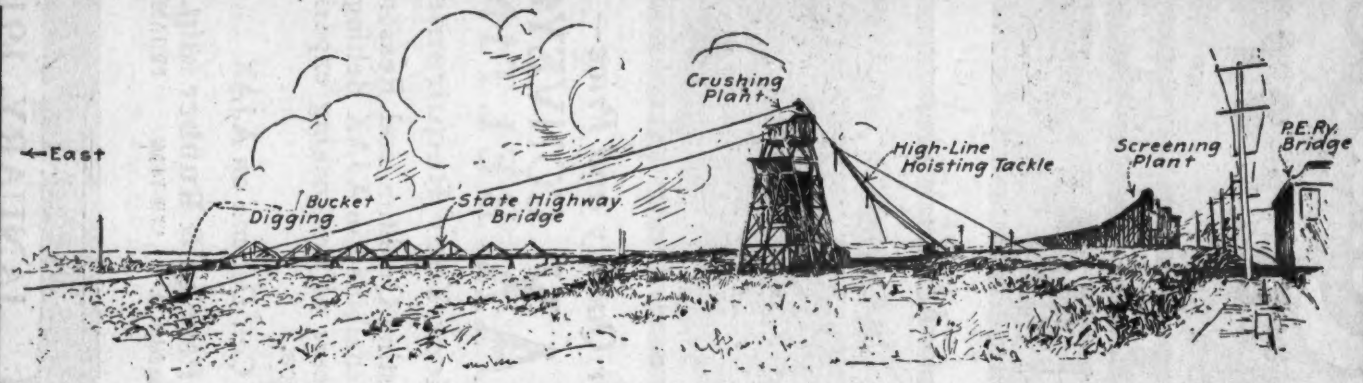


Here's a $500,000 Plant Representing the Acme of Efficiency and Productive Capacity

and It's Equipped with

SYMONS DISC CRUSHER

The plant is a new, up-to-date, electrically operated gravel crushing and screening plant of the Southern California Rock and Gravel Company at San Gabriel River, near Los Angeles. It is one of the largest and most complete of its kind that has ever been erected, having a capacity of 2,000 tons per 10-hour day.

The fact that Symons Disc Crushers are used in this highly efficient plant is eloquent testimony of the high efficiency and economy of these crushers. Their superiority over rolls, jaw or gyratory crushers for crushing gravel is unquestioned.

There are a number of notable features which distinguish the Symons Disc Crushers from others. Let us send you our Catalog "R", describing this equipment in detail.

CHALMERS & WILLIAMS 1430 Arnold St., Chicago Heights, Ill.

Pit and Quarry

Vol. 3 Chicago, Ill., January, 1919 No. 4

Getting the Industry Ready For Big Delivery

THE plant which is ready for big business will get it!

And by the same token, the man who waits to get an order before putting his plant in shape for rapid delivery, will wait a long time for the order.

This is going to be an unusual year—as lots of people are fond of telling you. They are absolutely right about it! It is going to be the most unusual year that some of us have ever seen. When business comes it will come quickly, and it will be impatient of delays. It will want to accomplish in a few brief months the work which has been held back from two to four years.

The man who is sure of himself and can calmly say, "Gentlemen, I am ready to deliver whenever you say the word," is going to be the man of the hour. He will be able to capitalize his efficiency and add a cent or two a yard to his price over the competitor who "hopes to be able to deliver soon."

There never were surer signs of coming prosperity than right now. Of course, the man who insists on playing safe and never taking a chance can wait until he has the orders thrust upon him before putting his plant in order and laying his plans for big and rapid delivery.

Many of the plants of the country have run along without even the ordinary repairs and upkeep of normal times. This was not to be wondered at, of course, considering the fact that our every energy was exerted to help in the winning of a righteous war for the peace of the world and the stability of democratic governments. But that victory is won.

We were accused of being unprepared for war; we may now perhaps be accused with equal sincerity of being unprepared for peace. But we met one situation and we can meet the other.

The man who has not sufficient confidence in his ability to forecast the future, to risk something on that forecast, has no place in business. He ought to be working for someone else who can think clearly and who is willing to back up his thinking with his money.

This all means that operators should put their properties in the pink of perfection NOW! If you have not sufficient confidence in the ability of yourself and your men to decide on the changes which should be made to insure maximum output, employ some good engineer to plan this for you. Give him a free hand to put your plant on a modern and efficient basis. Do not be satisfied with equipment which is worn out or which is not recognized as up to present-day standards. Labor is going to be too expensive to be supplied with anything less than big-result-getting tools and machinery.

How to Load Vehicles Economically

Showing the Principle Involved and Pointing Out the Waste Occurring in Rehandling Materials During the War—Economical Methods Discussed.

By Daniel J. Hauer, C. E.

A FEW months ago the writer visited a quarry and the first thing he noticed was the driver of a two-horse dump wagon loading the wagon from a stock pile with a shovel. Also during the past year, on half a dozen or more large government jobs, in unloading cars of crushed stone, slag, gravel, sand and similar materials, hand shoveling was likewise done. The cost of such handling, with men doing inefficient work at big wages, was very high, sometimes more than a dollar per ton.

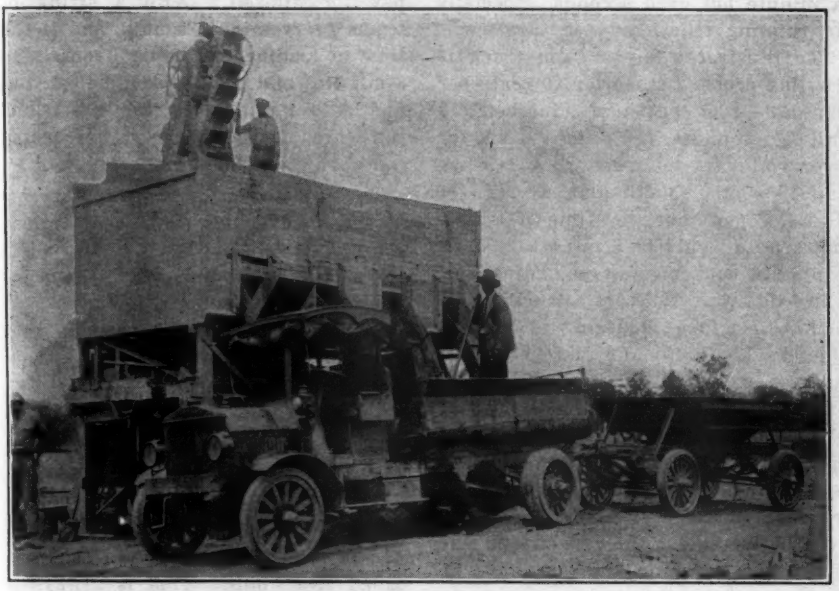
There will always be some cases where hand shoveling must be done in rehandling materials of the character listed; but that is not sufficient reason why such work as can be handled by machinery should be done by hand. With a shortage of labor and the high wages paid, it was almost a crime to have handled thousands of tons of materials by hand.

It is singular how a man's mind works that he does not see these things, especially when one considers that men in charge of work are supposed to have trained minds and some years of experience in their line, coupled with the knowledge that goes with such training and experience. The excuses and reasoning shown become laughable when they are analyzed.

One man was unloading about 30 carloads of slag and crushed stone per week. To do this he used about 20 wagons and an average of 40 men. About 5 carloads were handled per day, at least one day per week there being no unloading. With wages at 44 cents per hour for men and 88 cents for teams, the cost per ton ran at least $1.50 for loading and hauling the material. It is safe to say that with one of several types of unloaders on the market this cost could have been reduced to 50 cents per ton, cutting out ten teams and more than 30 men to be used on other work, they being badly needed. As it took more than 15 minutes for the men to load a wagon, it can be seen that the lost team time was considerable. Contrast this with a machine loading a wagon in from one to two minutes.

Upon one occasion the man in charge was asked why he did not get a machine for unloading these cars. His reply was characteristic of many excuses. "I have only from 300 to 400 cars to unload at this point and no man can beat me unloading cars with a bunch of men. Look, I am unloading nearly 5 cars a day, some days actually 5 cars, while down at the other end where they use a crane and clam-shell they don't unload more than 7 and 8 cars and when the crane breaks down my men beat theirs in unloading."

Let us see what this means. Suppose no one in the world could beat him unloading cars by hand, that would mean little if any second-class man could save a dollar per ton with a cheap machine. The fact that at another point on the same job the wrong methods were being used was no excuse for using obsolete methods at this place. The fact that at least



Rapid loading from a bin.

18,000 tons had to be handled at one place was enough to condemn the hand methods and justify the installation of some type of car unloader. Thus the first statement the superintendent made showed the futility of his own argument.

In another case an unloader was offered at what was considered a high rental. Those in charge said they could save money by purchasing a new machine. This was true, but the first machine was on the job ready for use. The new machine was never purchased and thousands of tons of gravel and sand were unloaded by hand. To have rented the machine would have saved both time and money.

A quarry man and contractor said: "With wagons you used to save time, but with my trucks I have cut out all horses, and now save so much time that the few minutes I take to load my trucks hardly count in the day's work."

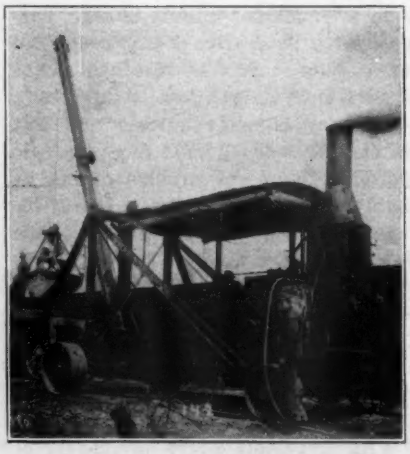
This brings us to the fundamental principle of wagon and truck loading. In normal times the earning capacity of a two-horse team runs from $5 to $15 per day. The earning capacity of automobile trucks of 2 to 6 tons' capacity runs from $20 to $75 per day. Thus the earning capacity of either team or truck per minute is high, running for a team from 1 to 3 cents and for a truck from 4 to 15 cents. Thus to save time on vehicles is important, but money is made quicker and lost faster with a truck than a wagon. So the quarryman was wrong to think he could be slow in loading a truck, because the truck could make up the lost time. The rate of wages, in normal times, for men runs from ¼ to ½ cent per minute, so it is possible to have one or more men idle waiting for a wagon or truck, and thus load them quickly and save money over keeping a vehicle waiting.

With a vehicle every minute is of importance, and it should be a struggle for the manager not only to save

a minute but even seconds, especially in running trucks.

To illustrate: Say a 5-ton truck is hauling crushed stone for 20 cents per ton mile, the length of haul being 3 miles, a round trip 6 miles. Thus for every mile traveled the truck is earning 50 cents. Making an average of 10 miles per hour, the time of traveling a mile would be 6 minutes. With 1 minute consumed in unloading and 3 in loading, in 10 hours a truck would make 15 trips. Reduce the loading time to 1 minute and the unloading to 30 seconds and another trip can be made in 10 hours. This means $3.00 per truck extra earnings and for a fleet of 5 trucks $15 per day. If this is accomplished, by hiring 1 or 2 extra men or installing a machine, or even by increasing the capacity or efficiency of a machine, the extra cost is soon met, and the investment is a profitable one.

Although it does not run into money so quickly, yet the principle is the same in handling a wagon. A single man loading a wagon, except under exceptional circumstances, is a mistake. The second man will more than pay for himself. With a string of teams every minute counts, and if the time of loading can be cut from 12 to 8 minutes and then to 4 and to 2, and finally to a minute or less, the teams can earn more, or else fewer teams can earn the same money.



Byers Auto-Crane, used for loading wagons by Western Improvement Co., at Ravinia, Ill.

Thus even if it is absolutely necessary to load vehicles by hand, a close study should be made so as to reduce the loading time and make the entire operation an economical one.

It is hardly possible with the limited space available to describe each machine on the market that can be used in loading and unloading the products of pits and quarries, but comments can be made upon each type of machine and method of handling such products.

In most cases vehicles and cars are loaded from bins. This is always a cheap method, but in designing bins, whether they discharge through the bottom or side, they should always be made self-cleaning, the material made to run out quickly and the doors or gates to open and close rapidly. This means the slope, if any, to the bottom or sides should be steep, never less than 45 degrees and for most materials 30 degrees. Bins should never have square corners on the inside. If bottom gates are used, then false steep bottoms should be built between the gates. These steep sides and bottoms reduce the storage capacity of the bins and add to their cost, but for quick loading they soon pay for themselves.

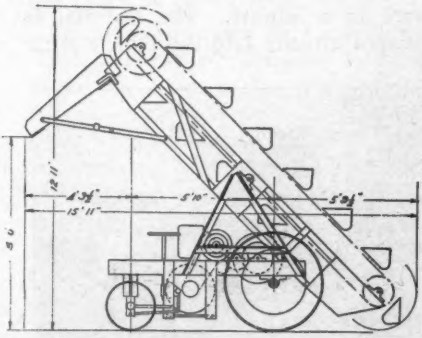
The gates should be large enough to discharge an ample volume at one time without spilling, else they are likely to choke up, or take some minutes to run out several tons. If the gates do not open and close rapidly the very purpose of designing large gates is defeated, for if several minutes are consumed in opening and closing them the operation is bound to be uneconomical. For loading vehicles

Loader made by Portable Machinery Co., Passaic, N. J.

the gate levers or handles must be within easy and quick reach of the driver at his seat, or again the load cannot be taken quickly.

The bin system can be used in unloading cars and in handling temporary stock piles. Cars can be run onto trestles under which bins can be built, the cars dumping into the bins and the vehicles being loaded from the bins. When it is not possible to build a trestle or use one already constructed, cars can be dumped into a boot under the track. Then by means of a self-tripping dump bucket, a chain of elevating buckets, or a belt conveyor, the material can be elevated to a loading bin set near the track. From this bin the vehicles are loaded. It can be seen that the material from a stock pile can be elevated to a bin in the same manner, or a derrick can be used with a grab bucket to keep the bins full, or a shovel dipper can be operated on the boom of a derrick, the material handled to the bins with that device.

With a derrick, a derrick car, a cableway or a locomotive crane with a grab bucket, material can be taken from a car or a stock pile and loaded directly into vehicles; but although this can be economical, yet to obtain the most efficient and rapid results bins should be used. A 5 or 6-ton truck may be loaded in a minute or less from a bin holding 10 to 15 tons, while it would take 5 or 6 minutes to load such a truck directly with the bucket; for there must be from 3 to 6 dips of the bucket to make a load. These buckets also break up the bodies of trucks and wagons easily when



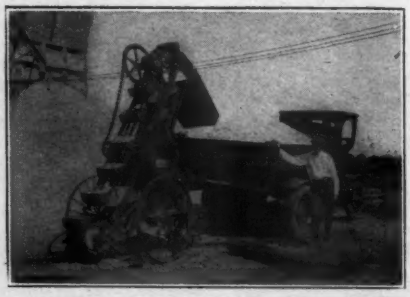
Haiss self-propelled wagon loader. This machine can also be used for delivering to stock pile or cars, by attaching to the discharge a belt-conveyor section which is a part of the equipment.

Car unloader, made by Burch Plow Works Co., Crestline, Ohio.

dumping directly, while not so much damage is done to bins. With bins a vehicle should never have to wait for its load.

Grab buckets in unloading cars never clean out the car with a flat bottom; they leave material in the corners and ends and some along the sides. With hopper bottom cars the hoppers cannot be cleaned. This must be done by hand or handled by a type of unloader that takes the material from the bottom of the hopper.

There are several types of such machines on the market. They are equipped either with buckets or scoops or with belt conveyors. These machines work rapidly, handling a ton or more in a minute. The material is dumped directly into the vehicle without injury to the latter. Such machines as these with derricks or cranes and grab buckets should have been used on the large government jobs during the past two years. Although the writer is familiar with more than a dozen of these undertakings, yet he failed to see where the materials were handled in this manner.



Wagon loader in service of Artesian Stone and Sand Co., Chicago. Made by Gifford-Wood Co., Hudson, N. Y.

Speed was essential and material was being shipped in all kinds of cars, flat bottoms with 3 or 4 dump doors in them and other styles of cars. With a crane and bucket and an unloader, every one of the cars could have been handled quickly and economically. The unloaders would have handled some cars by themselves, while others would have been unloaded in part by the crane and finished by the unloader. The only hand work would have been in the flat bottom gondolas without doors, and this only to clean out the few tons that the grab bucket could not pick up.

These types of unloaders can also be used to rehandle stock piles in yards, pits and quarries.

Another method of re-handling materials from cars is by means of a chute or hopper fastened to the side of a car. These rapid unloaders are loaded by hand from the car and dumped into the vehicle. One or two hoppers make a load for a wagon, but it takes a number to give a truck a load. These do not cheapen the cost of shoveling, but they save time for the vehicle, which is an important item as already shown.

There are two other types of these hoppers, neither of which is fastened to the side of the car. One stands on a steel frame along side of the car and dumps into the vehicle by tipping on one side. The other is of the same shape and general character, but is let down from the supporting frame

onto the running gear of the truck, becoming its body for the next load, the empty hopper or bottom having already been placed on another stand to be loaded. The capacity of these hoppers will vary from 2 to 5 tons.

With these many devices and methods it is possible to cut out the lost vehicle time and much of the labor costs that have been all too common during the past two years.

Merger of Eastern Stone Crushing Plants

Seven Concerns Showing Their Confidence in the Big Market Immediately Ahead.

PUTTING into effect practical efforts to cut cost of construction to consumers, a $2,650,000 merger of eight great stone crushing plants supplying this market will be perfected soon, according to the Dow Service Daily Building Reports, New York.

The deal has been brought to a head because of the faith that every building material interest has in the vast market that lies directly ahead of building and road contractors. It involves seven concerns with plants located at various points along the Hudson River and one at East Haven, Conn. The new company is to be known as the New York Trap Rock Corporation and will have its headquarters at 101 Park avenue, N. Y., with Nathanial D. Lancaster, president; Mortimer D. Wandell, vice-president; James J. Shaw, vice-president; R. W. Jones, Jr., treasurer, and R. E. Desbernini, secretary. The directors are to be Wilson P. Foss, long identified with the crushed stone interests of New York; John E. Mead, ex-governor of Vermont; Nathaniel D. Lancaster; Mortimer D. Wandell; James J. Shaw; William A. Barber; R. W. Jones, of McBee, Jones & Company, 120 Broadway, bankers; C. C. Dickson and J. J. Williams. The financial interests in the enterprise were represented by R. W. Jones of 120 Broadway, New York, who says:

"The completion of negotiations for the acquisition of these important crushed stone properties is the culmination of a general belief in the great future for building and road construction, and the imperative necessity for transacting business without regard to kind along intensive lines. Under the unification of these plants, much can be accomplished in putting the building market in more stable condition. The capitalization will be $2,650,000, divided into $750,000 in first preferred cumulative bonds, $400,000 in second preferred non-cumulative bonds, and the remainder in common stock. Incorporation will be under the laws of the State of New York."

The two principal companies involved in the transaction are the New York Trap Rock Company, now at 17 Battery Place, and the Upper Hudson Blue Stone Company at 26 Cortlandt street. Except for the plant of Calvin Tompkins at Tompkins Cove, the combination practically embraces all the stone crushing establishments supplying this market through either the North or East rivers.

Simultaneous with this announcement, other road building interests began to prepare for the coming movement in road work and building construction. The prospects for road construction and improvement this coming year are far beyond the programs of other years in scope and character of construction. The current quotation on crushed stone in the New York market is approximately $1.85 a cubic yard, whereas one year ago the price was $1.65 and the year before that $1.20, and a normal rate of about 80 cents a yard.

ONE OF THE PITS OF THE J. FRED SMITH GRAVEL COMPANY.
This pit is located on the Frisco Railroad. The cut illustrates the method employed to dispose of strippings. Depth of gravel here runs from 11 to 14 feet.

Pit-Run Gravel for Construction

Output of Extensive Texas Pits Used Without Screening or Mixing, for Concrete Work, as Well as for Ballasting and Roads.

By John E. King

THE J. Fred Smith Gravel Company, of Dallas, Texas, was organized in 1912 by J. Fred Smith and Rhea Miller with a capital stock of $75,000, since increased to $200,000. It is now one of the largest concerns of its kind in the South, owning nine different tracts of gravel land in the Trinity River bottoms, all within seventeen miles of Dallas. These aggregate something like 2,000 acres and contain, according to estimates made by experienced engineers, more than 10,000,000 cubic yards of excellent material, the distinctive feature of the output being that the pit-run gravel as loaded from natural deposits direct to railroad cars is of a content admirably adapted for concrete work, requiring no screening and no further mixing.

Weather cuts little or no figure in the operations of the company, for the material is loaded direct from the natural deposits to railroad cars by steam shovels and draglines, and these loading operations can be carried on in any kind of weather.

The following extract from a mechanical analysis made by the Bureau of Economic Geology and Technology of the University of Texas, at Austin, shows the content of this pit run gravel:

Material retained on:

Diam. ring sieve	Per cent	No. of sieve	Size of opening	Per cent
2"	...	10 mesh	.065"	71.5
1½"	2.9	20 mesh	.0328"	77.8
1¼"	5.1	28 mesh	.0232"	82.5
1"	12.6	35 mesh	.0164"	90.5
¾"	24.4	48 mesh	.0116"	97.0
½"	40.3	65 mesh	.0082"	98.6
¼"	56.5	100 mesh	.0058"	99.3
⅛"	66.4	200 mesh	.0029"	99.8

Passing ⅛" diam. ring sieve, 33.6 per cent. Passing No. 200 mesh, by analysis .3%.

Weight per cubic foot shoveled loose ..... 122½ lb.
Weight per cubic foot, shaken to refusal ..... 129¾ lb.
Specific gravity 2.63
Voids in loose gravel 25%
Voids in packed gravel 22%

The mechanical analysis or sizing test shows this to be an exceptionally well graded gravel, from 1½" to dust, for a mixed sand and gravel. The aggregate consists of rounded and flat particles of limestone, ferruginous sandstone, and some shells, well graded. The finer particles are quartz and calcareous sand, free from clay. To a number of the larger particles a layer of sand is cemented with a calcareous deposit.

Concrete made using this gravel in a 1:4 mix contains about the same cement as would be in a 1:1½:3 mix if the material were screened and remixed, while a 1:6 mix would be about the same as a 1:2½:5 mix of screened and remixed materials.

The tests indicate that this is a very good concrete aggregate and need not be screened and remixed, provided it runs uniform in grading as indicated by the mechanical analysis.

This technical report is backed up by numerous grain elevators, office buildings, viaducts, bridges and culverts made from concrete in which pit-run gravel was used as it came from the pit without having been screened and remixed. Prominent among these is the Dallas County Viaduct, spanning Trinity River bottoms and connecting the city of Dallas with Oak Cliff, and said to be the longest solid concrete structure of its kind in the world.

The company also furnishes much road building material and ballast for railroad tracks. The gravel suited for concrete work lies imbedded in the Trinity River bottoms, overlaid with from one to three feet of red clay and sandy loam. For road ballast a mixture is made of 15 per cent of the red clay that overlies the gravel and 85 per cent of the gravel itself. This gives a waterproof covering for roads, the clay acting as a binding agent. This mixed sand, clay and gravel is also much used as railroad ballast, and tracks are now ballasted with it for 100 or more miles in all directions from Dallas.

The J. Fred Smith Gravel Company is equipped to handle its material with a minimum of cost. Spur tracks have been built through the hearts of these gravel tracts, which are all located close to railroad lines, and loading is done in all cases by steam shovels or by drag lines direct from gravel pit to railroad car.

The company owns and operates three steam shovels, two of the Marion type and one Bucyrus, all of two-yard capacity. The company also operates two drag lines—one Marion caterpillar using Leschen cable and one Bucyrus machine. The combined loading capacity is 200 carloads, averaging 30 cubic yards per ten-hour day.

Stripping is done by the steam shovels, the strippings being thrown to one side with more or less of the gravel. When material for road ballast is wanted, the strippings-and-gravel mixture is loaded onto the cars in proper proportion by means of the shovel, just as the gravel was handled before. The surface layer of red clay and soil over the gravel varies from one to three feet, while the gravel itself runs from 11 to 14 feet in depth.

Two miles of track, built by the company, serve all the gravel pits and connect with the three lines of railroad that traverse that section, the Missouri, Kansas and Texas, the Frisco and the Rock Island, giving the advantage of one-line freight rates from its pits to Texas and Oklahoma points.

PIT AND QUARRY places us in touch with a line of manufacturers whose materials we can use.—G. A. Resek, secy., The Lorain Sand & Gravel Co., Lorain, Ohio.

ASSOCIATION ACTIVITIES

New Constitution Plan of S. and G. Men.

Its Adoption Will Be One of the Big Features of the Convention in Chicago This Month

THE adoption of a new constitution will be one of the principal matters to be passed upon at the annual convention of the National Association of Sand and Gravel Producers. This convention will be held in the Red Room of the La Salle Hotel, Chicago, January 28 and 29. The first session will be at 10 a. m. on January 28, and two sessions will be held each day.

Mr. B. H. Atwood of Chicago holds the important position of chairman of the constitution committee.

The new constitution as at present outlined for presentation to the convention, provides for a smaller executive committee. Under this new provision the committee will consist of five members, whereas at present it consists of nine members.

The officers, if this constitution is adopted, will be elected for two years instead of one year, but provision will be made for the election of half of the officers and executive committee members in alternate years, so that not all of them will go out of office at the same time.

It is hoped also to have a new officer, with the title of general manager, who will devote all of his time to the Association and carry on some intensive promotional work.

There will also be an advisory council of regional directors. For this purpose the country will be divided into a number of districts and a director chosen from each district. If it is possible for the members in a district to select a director themselves, this will be done; if not, one will be appointed by the executive committee. The object of having these regional directors will be, of course, to keep the organization in closer touch with the membership and to assist in directing its efforts along the lines of greatest need.

It is also proposed to change the method of financing the Association. Heretofore, the members have paid a flat annual fee of $25 irrespective of the size of their output. This has not been sufficient to carry on the work of the Association, and some of those who are especially interested have gone down into their pockets for $100 each, or such a matter, to keep the work in motion. It is now proposed to levy an annual assessment on a tonnage basis. For the purpose of arriving at a rate of assessment a budget will be made out at the beginning of the year covering all the various items of expense necessary to carry on the work of the year. This amount will then be equalized over the total tonnage capacity of the members and each member will pay his pro rata share according to his output.

There will probably be considerable discussion of various provisions of this new constitution on the floor of the convention, but it is anticipated that the membership will approve of at least most of the sections and that the constitution will be put into effect very largely as outlined.

The Executive Committee will at the convention present a program for the year's activities, subject to the approval of the members. This is a strictly democratic organization, sole-

ly for the benefit of the membership, and it is expected that their wishes will govern in every case.

One of the subjects which will have considerable prominence on the convention program will be that of freight rates. This and various other topics pertinent to the present activities of the sand and gravel industry will be discussed at round table of conferences which will be an important part of the convention sessions.

Stone Association Meets In Buffalo.

New Members Coming In—Seven Live Subjects So Far Outlined for Convention Discussion

THE annual convention of the National Crushed Stone Association will be held in Buffalo, N. Y., February 11 and 12. This was decided upon at a meeting of the executive meeting in Chicago on December 12.

The matter was considered of holding a joint meeting with the sand and gravel operators, but an agreement was reached not to hold such a meeting this year. However, an invitation was extended to the sand and gravel men to hold their annual meeting at the same time and in the same city and to join in a general banquet on Tuesday evening, February 11. This proposition did not reach the sand and gravel men in time for their favorable action, however, and their convention was set for January 28 and 29 in Chicago.

The treasurer, Mr. A. J. Sullivan of Chicago, reported a third assessment to meet expenses up to the time of the convention, and the secretary was directed to render bills to members for such an assessment at the rate of 2 cents per hundred tons.

At a later meeting on the same day, officers and members of the Association met and talked over a number of problems vital to the industry as well as matters pertaining to the welfare of the organization. Mr. R. Boyle of Toronto, Canada, was present and asked that his organization be taken into membership and a bill for the full 6-cent assessment for the year be sent him, amounting to $150. Applications for membership also came in from Kentucky, Massachusetts, California and Florida, showing that interest in the organization is nation wide.

It is expected to make the Buffalo convention a winner and of such value that every stone man will make more money by attending it than he will by staying away.

The following subjects have been proposed for discussion at that time:

1. Reduction of freight rates—Fair price for ballast.
2. Open price system of competition—Anti-trust law.
3. Production cost and cost keeping to govern prices.
4. Standard stone sizes as a profit source.
5. Welfare work—Personal comfort of employees—Bonus system—Piece work—Wage scales, etc.
6. National Association as clearing house to dispose of surplus machinery and operating equipment.
7. Increasing profit by decreasing expenses—Hints worth $100 each.

Those present at this meeting were:

A. J. Blair, Milwaukee.
A. J. Sullivan, Chicago.
R. B. Tyler, Louisville, Ky.
R. W. Scherer, Milwaukee.
R. Boyle, Toronto, Can.
J. J. Urschel, Toledo.
L. H. Hawblitz, Toledo.
H. E. Bair, Toledo.
Thornton Dixon, Monroe, Mich.
C. M. Doolittle, Ontario.
F. W. Katterjohn, Paducah, Ky.
W. J. Sparks, Mt. Vernon, Ky.
James Savage, Buffalo.
John Rice, Easton, Pa.
Allen Patterson, Lima, Ohio.
A. Acton Hall, Piqua, Ohio.
F. W. Kanengeiser, Youngstown.
E. C. Dunbar, Detroit.
John D. Ohrt, Lannon, Wis.
A. P. Sandles, Columbus, Ohio.

F. W. CONNELL,
Re-elected Secretary of Indiana Crushed Stone Association.

Collett Made President of Indiana Stone Men.

All Members Were Present at Annual Convention Which Ended with a Banquet

THE Indiana Crushed Stone Association held a successful annual meeting in Indianapolis, December 17. All the members of the Association were present, and the meeting is characterized as the best this organization has ever had.

The following officers were elected for the year:

President, John Collett, Mgr. A. & C. Stone & Lime Co., Ridgeville, Ind.

Vice-Pres., C. N. Hodgin, Mgr. Kokomo Stone Co., Kokomo, Ind.

Treasurer, E. T. Milligan, Mgr., Muncie Stone & Lime Co., Muncie, Ind.

Director, L. H. Hawblitz, Asst. to Vice-Pres., France Stone Co., Toledo, Ohio.

Director, Bernard E. McNulty, Gen. Mgr., Mitchell Lime Co., Chicago, Ill.

F. W. Connell was re-elected secretary for the year 1919, and the members showed their appreciation of the work he has put into the organization by giving him a substantial increase in salary.

The day closed with a banuet at the Claypool Hotel, with the following program:

TOASTMASTER
E. B. Taylor

"GOOD ROAD LEGISLATION"
M. E. Noblet, Sec'y, Hoosier State Automobile Ass'n

"INDIANA'S NATURAL RESOURCES"
Hon. Edward Barrett, State Geologist

"VALUE OF GOOD ROADS"
Hon. L. W. Duffy, State Senator of Indiana

"MACADAM ROADWAYS"
A. P. Sandles, Sec. National Crushed Stone Ass'n

"COUNTY UNIT LAW"
Hon. Jos. G. Hayes, Pres. Indiana County Commissioners' Ass'n

"STANDARDIZATION OF SPECIFICATIONS"
R. C. Yoeman, Associated Professor of Highway Engineering

In addition to the members, a number of guests were present at the banquet.

Kentucky Stone Men Organize.

Following a two-day session of prominent stone crushers of Kentucky at the Seelbach Hotel, Louisville, the Kentucky Crushed Stone Association was launched late in November. The organization is composed of quarry operators who operate crushing plants for furnishing crushed stone for building, railroad, highway and other construction, and any crusher operator is eligible to membership.

The plans of the association are to unite the trade on a firmer basis. It is planned to bring about greater cooperation, and better maintenance of markets, better methods of quarrying, interchange of information concerning machinery and quarrying in general, and such matters as freight rates, deliveries, coal supply, general supplies, labor and selling terms.

The meeting was called by R. Brink Tyler, head of the Tyler Building Supply Co., R. B. Tyler Stone Co., and Banner Coal Co. Mr. Tyler had originally planned holding the meeting in compliance with the wishes of the War Service Committee on Mineral Aggregates, which was formed at Washington some time ago with the object in view of assisting the government in winning the war. While this necessity has disappeared to some extent, Mr. Tyler, who is committeeman for Kentucky, felt that such an organization was needed in Kentucky, and would result in closer coöperation of the quarrymen. It is believed that much good can be done through getting the members of the trade together frequently and discussing the best methods of marketing and producing.

Seventeen crushing plants were represented at the meeting. A temporary organization was launched which was made into a permanent body at another meeting held at the Seelbach Hotel, on December 18, at which a considerably larger attendance was on hand.

The organization was completed by electing the following officers:

President—W. J. Sparks, Mt. Vernon, Ky.

Vice-President — F. W. Catterjohn, Paducah, Ky.

Secretary and Treasurer—R. B. Tyler, 114 S. 4th St., Louisville, Ky.

The initial fee of the association will be $10.00 and the dues per year are to be fixed later. The officers have extended an invitation to all crushed stone producers in the State of Kentucky to join this organization.

Mr. Tyler was appointed as a delegate to attend the National Crushed Stone Association convention at Buffalo in February.

The next meeting of the association will be called in April.

Producers Work Together in Wisconsin

Mineral Aggregate Association Is Formed, with A. J. Blair as First President

A NEW association, known as the Wisconsin Mineral Aggregate Association, was organized by about thirty operators of stone and sand and gravel plants, at Milwaukee, December 19.

According to the constitution adopted at that time, membership is open to any person, firm or corporation engaged in the production of a mineral aggregate for delivery to destinations in the state of Wisconsin.

The objects of the new organization are stated as follows:

A. To promote and extend the uses of mineral aggregates by devising ways and means of conveying to the public the merits of the product.

B. To create and extend cordial and friendly relations among the producers and users of mineral aggregates; to discourage unfair and unscrupulous business methods; to promote higher and better business ethics.

C. To introduce and encourage a uniform cost system whereby each producer may know his true cost production; to collect and disseminate production and cost data among producers, in order that all may profit by experiences of others.

D. To furnish producers confidential information on credit standing and responsibility of the mineral aggregate buyers.

E. To accomplish by united effort all the common operating conditions conducive to efficient production, such as proper common carrier rates, demurrage charges, specification, uniformity of sizes, car shortage, etc.

F. To bring the industry up to a standard of efficiency, whereby all may operate under conditions conducive to a fair return.

G. To conduct all the efforts in strict conformity with existing laws and in no manner to restrain trade or competition.

A. J. BLAIR

The following are the officers:

President: A. J. Blair, Milwaukee.
Vice-President: J. C. Buckbee, Chicago.
Secretary-Treasurer: I. M. Clicquennoi, Milwaukee.
Members of the Executive Board: Ed. E. Gillen, Milwaukee; J. K. Jensen, Janesville, Wisconsin.

The following were present:

Elkhart Sand and Gravel Co., Louis Laun.
J. Donahue and Sons Co., John H. Donahue.
Moraine Gravel Co., A. A. Lee.
Northern Gravel Co., J. C. Buckbee.
Waukesha Lime and Stone Co., E. E. Gillen, J. J. Sloan.
Wisconsin Sand and Gravel Co., Chas. P. Biesanz, I. M. Clicquennoi.
Okauchee Gravel Co., W. S. McDowell.
W. E. Lippmann Co., W. E. Lippmann.
Schneider Stone Co., E. L. Schneider.
G. D. Francey Coal, Stone and Supply Co., G. D. Francey.
Davis Bros. Stone Co., E. A. Orth.
Lake Shore Stone Co., A. J. Blair.
Mayville White Lime Works, H. A. Martens.
Sheboygan Lime Works, E. H. Roth.
Union Lime Co., R. W. Schrer.
Cook and Brown Lime Co., R. C. Brown.
Wauwatosa Stone Co., A. L. Story.
Wisconsin Granite Co., J. J. Sloan.
Universal Stone Co., E. A. West.
Waukesha Washed Sand and Gravel Co., Geo. Brew.
Racine Stone Co., F. J. Deutche.
Janesville Sand and Gravel Co., J. R. Jensen, E. A. Brown, W. R. Lane.
Wilcox Sand and Gravel Co., C. R. Wilcox,

Federal Commission Endorsed

Highway Congress Biggest of Its Kind—Williams Re-elected President of Industries Association.

The big idea of the Highway Congress which met in Chicago the second week in December, was the development of an intensive federal highway program through the creation of a Federal Highways Commission.

The sentiment of the congress was finally expressed in the following resolutions:

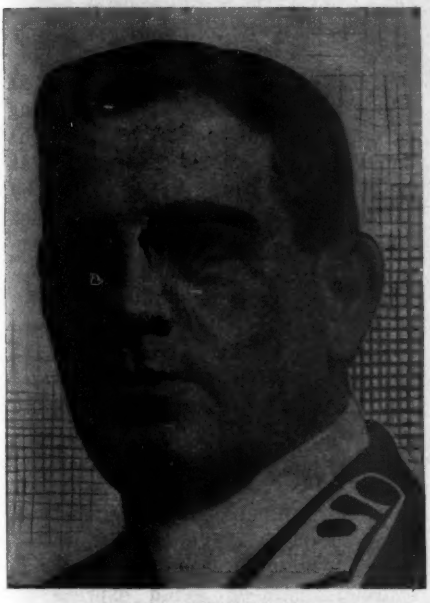
WHEREAS, the President of the United States in his recent message to the Congress, recognized the value of Improved Highways in the general transportation system of the nation and definitely recommended and urged their rapid development; and

WHEREAS, this work is necessary to give employment to our returning soldiers and also to furnish worthy projects on which unemployed labor can be engaged during the period of readjustment; and

WHEREAS, we recognize the necessity for a well defined and connected system of improved highways in order to expedite the distribution of large volumes of food stuffs now wasted on account of the lack of prompt and adequate highway transportation and to better serve the economic and military needs of the nation.

THEREFORE, BE IT RESOLVED, that a Federal Highways Commission be created to promote and guide this powerful economic development of both highways and highways traffic and establish a national highways system.

BE IT FURTHER RESOLVED, that the present appropriations for federal aid to the states be continued and increased and the states urged to undertake extensive highway construction so as to keep pace with the development of this country and its transportation needs, and that in carrying out the provisions of the present Federal Aid Act or any amendment thereto that the state highway de-



S. M. WILLIAMS,
President Highway Industries Association.

partments shall co-operate with the Federal Highways Commission.

BE IT FURTHER RESOLVED, that all governmental activities with respect to highways be administered by the Federal Highways Commission.

The Congress was held under the joint auspices of the Association of State Highway Officials and the Highway Industries Association, and was the largest and most enthusiastic meeting of the kind ever held in the United States, auguring well for the development of an active year of road building.

When the program was first outlined, the war was still on and the program was developed with the idea of adjustment to war-time necessities. But it was quickly "accommodated" —as President Wilson would say—to the change which occurred in the meantime and easily fitted into the general plan of reconstruction.

Lt.-Col. Wm. D. Uhler, president of the American Association of State Highway Officials, opened the Congress. An address of welcome was delivered by Governor Frank O. Lowden. Responses were made by Edwin S. Duffey, of New York, for the Association of State Highway Officials, and S. M. Williams, of Ohio, as president of the Highway Industries Association. In his response Mr. Williams said:

"When one of our leading publications recently stated that the Highway Industries can well afford to entirely ignore any thought that in working for good roads they are working in their own interests, but that they are working for the interest of the nation, and every mile of good road built adds to the sum of human happiness and to the nation's ability to utilize its resources for the production of food stuffs and for increasing its manufacturing facilities, they expressed the same thought and purpose which caused the highway industries of the United States to come together in the organization of the Highway Industries Association about one year ago."

At the annual meeting of the Highway Industries Association the following officers were elected:

President, S. M. Williams, Lima, O.

First Vice-President, G. P. Coleman, Richmond, Va.

Second Vice-President, E. J. Mehren, New York City.

Third Vice-President, Chas. J. Lang, Cleveland, O.

Secretary and Treasurer, H. G. Shirley, Washington, D. C.

Indiana Men to Meet.

The annual meeting of the Indiana Sand & Gravel Producers' Association will be held in Indianapolis January 21 and 22. The sessions will be held at the Claypool Hotel.

A program of discussions of some of the topics that are especially pertinent to the Indiana district will be taken up. A banquet is planned for the evening of January 21.

Pit and Quarry

Rand-McNally Bldg., Chicago, Ill.

Published Monthly

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D. J. HAUER, Associate Editor

RICHARD K. MEADE, C. E.,
Contributing Editor

PHILIP H. HALE, Jr., Southwestern Representative
5710 Waterman Ave., St. Louis

H. W. BOOTH, Ohio Representative
552 Hippodrome Annex, Cleveland

THE restrictions of the Capital Issues Committee are no longer in force. With the coming of the new year, no permits are necessary for the capitalization of new enterprises. Bond issues for highways and other legitimate public works may now go ahead, up to any limit which the public weal demands and the public wealth is able to finance. Producers and dealers should appreciate the advantage which this policy of the Government means to them, and prepare for the volume of business which it is sure to bring.

A FEW municipal, county and state officials who have not gone below the surface, are inclined to expect that prices are going to go down, and are disposed to wait for this to happen, rather than proceeding with the work which needs to be done. This would be a commendable theory if based on a correct assumption. But it is not!

The Material Producer's Opportunity.

THE road building movement in the United States is assuming tremendous proportions. The importance of better highways was emphasized during the late war by the annoying freight congestion, bringing into service as it did thousands of motor trucks which attempted to make up for the inability of railroads to transport the immense freight and express offerings brought about primarily by the abnormal movement of goods to the Atlantic seaboard.

Our highways had not been constructed to withstand the heavy traffic thus imposed upon them, and, as naturally might have been expected, broke down under the strain. As a railroad engineer would express it, they were not sufficiently ballasted. They were too lightly built.

Briefly, the answer to the problem is more ballasting material.

When our army engineers who have seen service in France return to this country, they will not be satisfied with the lightly ballasted American roads. They know from their experience in Europe the desirability, nay, the necessity, of good foundations, thick and well bound surfaces. They will undoubtedly introduce into this country the military ideas as to what constitutes good road construction.

The time is ripe for improving the roads of the United States. Everything favors the movement. The realization of the necessity for better roads, the availability of labor to do the work, the quarries prepared to furnish the stone because of the small amount of other building in prospect, and the pressing demands of the farmers for better highways all point to the fact that NOW is the time to start improving the country's highways.

The farmer has long realized that good roads mean increased trade between the farm and city homes, higher profit to the farmer by cutting out the middleman, farm to home sales for eggs, poultry, pork products, vegetables, and all farm produce.

It is the desire of the Government as well as of the business interests of the country to create work for the thousands of returning soldiers and the even greater thousands of exmunition workers released by the discontinuance of war activities.

The material producer should take advantage of this opportunity to sell an unprecedented output. Ordinary building activities probably may not call for a large amount until materials and labor markets reach what are generally considered to be normal levels, but this condition, we anticipate, will not affect or curtail road building activities.

The one best bet, therefore, is road building. Producers do not have to create the interest nor initiate the movement. Industrial and political conditions have attended to all of that for them. Nevertheless, they should get behind the movement and push. They should, by every means in their power, increase the interest in good roads movements in their part of the country. Getting the people, especially the farmers, the business men and all others who would be benefited by better highways, to talking about and agitating for increased road production and better roads will actuate those having the initiation of municipal, county and state appropriations to take the proper action.

All this is going to help create a demand for crushed stone, gravel, cement, and other road making materials. In fact, 1919 ought to be the harvest for manufacturers of road machinery and producers of road materials.

ONE OF the problems in reconstruction to meet new conditions which is soon to come up is that of the adoption of a new constitution for the National Association of Sand and Gravel Producers. The time is ripe for some intensive promotional work. The sand and gravel men realize this, and they know that it cannot be done to the best advantage under the document which is at present doing duty as a constitution. We hope to see the new instrument go through about as outlined in another part of this issue, because we believe it will "promote the general welfare" and be for the best interests all around. The National is cutting out a man's size job for itself. But it is a man's size organization.

IT IS possible to find some new reason for improved highways every way we turn. For instance, there is the increase in express rates. The people of the United States are not going to stand for this except insofar as it is absolutely necessary. The express business will still exist, of course, and will collect such rates as it chooses to charge; but it is a foregone conclusion that out of this move will come the development of many more motor truck lines in those parts of the country where the condition of the roads will permit. And the better the roads the more of these there will ultimately be.

IT IS claimed that the railroads have been operated at a loss under Government control. But it is safe to say that none of this loss has been occasioned by reason of the carrying of stone, sand, or other products of the pit and quarry. On the contrary, a comparison of rates will show that these products have helped to reduce the deficit on other less profitable classes of freight. This is an unpleasant fact; but it is a fact.

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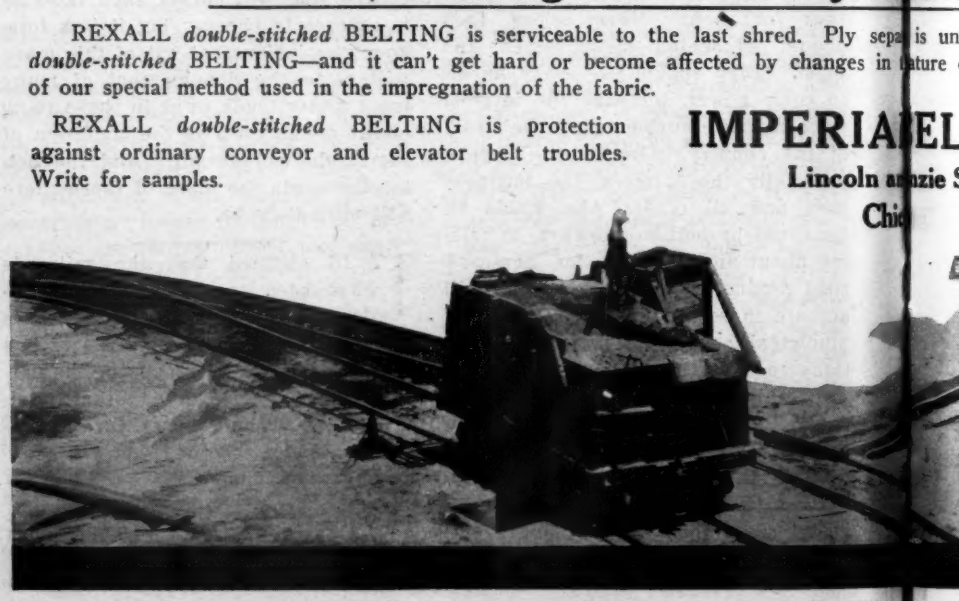

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Rock Quarrying for Cement Plants

By Oliver Bowles.

The raw materials for the manufacture of cement are excavated by three different methods, quarying, mining, and dredging, says Mr. Bowles in Bulletin 160 of the Bureau of Mines, Department of the Interior.

Open-pit quarrying is the method most commonly employed. It is claimed that about 85 per cent of all the raw material used in the manufacture of cement is quarried. Mining of cement material is a modification used where the overburden is so thick that stripping would not be practicable. Dredging is employed in the removal of marl from lake bottoms.

THE plan of quarry development that will give the best results is governed by the depth of stripping, the thickness and attitude of the beds, the structure of the rock, and the uniformity of its chemical composition in the same and in successive beds.

If the overburden is thick, deep quarying should be pursued if conditions will permit, for thus the maximum quantity of rock is obtained for a minimum of stripped surface. If the good rock is not thick enough to make deep excavation possible, cheap methods of stripping must be employed to make quarrying profitable.

Where the overburden is thin and a great thickness of rock is available, the depth to which the quarry may be worked is a matter of choice. The quarryman should seek to develop a quarry face of the height that can be worked the most cheaply. Usually a face 30 feet high or higher is more cheaply quarried than one less than 30 feet in height.

If the beds are flat the direction of the quarry walls is influenced only by surface contour, by structural features such as joint planes, or by the most convenient situation for transportation lines. However, for steeply inclined beds it is usually better to make the quarry face at right angles to the strike of the beds and thus cut across successive strata. When the face is in this direction the rock is more easily blasted and a more uniform mixture is obtained.

In beds dipping at a low angle it is usually wise to quarry in such a manner that the face is moved up the dip. By this method drainage from the face is insured, the rock is thrown down and loaded more easily than when worked in the opposite direction, and the loaded cars may be partly or entirely moved by gravity.

In choosing a suitable level for a bench or quarry floor in a rock deposit where the beds are approximately horizontal, the operator should be governed chiefly by the position of open bedding planes. Such planes promote effective blasting and also make a smooth floor, which greatly simplifies the laying of tracks and the loading of rock.

Where the strata are extremely folded and contorted with synclines, anticlines, and faults the process of quarrying may be more complicated. Especially is this the case where dolomite and limestone are interbedded as in a certain Georgia quarry. In that quarry the beds are folded, have irregular axes, and the structure is

complicated by faults. The dolomite, in general, forms the axes of the anticlines and is interbedded with the limestone at various levels. It is a difficult matter to quarry this rock in such a way as to avoid the dolomite. The method used is, in general, to maintain a quarry face at right angles to the axes of the folds and to work out the synclines. The dolomite, however, occurs in many unexpected places, and the problem is therefore beset with many uncertainties.

NATURE AND EXTENT OF OVERBURDEN.

Stripping or removal of overburden is a very variable factor in quarrying. Some deposits are exposed and no stripping is necessary. In other places the removal of 40 to 50 feet of cover may be necessary, whereas a depth in excess of 50 feet is common. As a rule, no attempt is made to remove such excessive overburden. The rock deposit is either classed as unavailable or tunnel methods of quarrying may be employed.

The overburden may consist of clay, sand, gravel, or a mixture of these substances, and may contain boulders of various sizes. It may be soft and easily excavated by hand or with a steam shovel, or it may be so hard that blasting is necessary. All these factors must be considered in determining the best means of removal.

CONDITIONS GOVERNING METHOD OF REMOVAL.

In choosing the cheapest method for stripping, a number of factors must be considered. If a great quantity of material must be removed, rapid and efficient means, such as a steam shovel, should be employed, whereas a thin overburden may justify the use of more expensive equipment, although the cost per ton of stripping might be larger.

Much depends on the nature of the rock surface. If it has channels and pockets filled with clay or other material, removal of this material with machinery may be difficult, and the use of slower and less efficient hand methods may be necessary. Conditions become more complicated if the pockets contain masses of rocks.

The firmness or solidity of the overburden also influences the method. In some uarries the material may be readily removed with shovel, scraper, or clam-shell bucket without previous loosening, whereas in other places blasting may be necessary. The availability to a suitable dumping place governs to a considerable extent both the method of excavation and of transportation. Water supply and drainage are factors of extreme importance where hydraulic methods are contemplated.

METHODS EMPLOYED.

Hand shovels and dump carts are employed at some quarries where the amount of material to be removed is limited, and also at some quarries where the overburden is thick, but where the irregular rock surface discourages the use of steam shovels or other mechanical devices. In many instances clay could probably be removed more cheaply from large pockets with a clam-shell bucket than by hand loading. Hand loading is expensive, a cost of 30 cents or more a yard being common, hence this method should be avoided wherever possible.

Where a thin overburden must be removed from a wide surface and the dumping place is convenient, teams and scrapers may be used. Where removal to a considerable distance is necessary, the material is sometimes rehandled. At one Iowa quarry the soil was taken in scrapers to an elevated platform, dumped through an opening into dump carts, and hauled away with horses. By using wheel scrapers, rehandling could have been avoided.

Conveyor and steam shovel used for stripping in an Ohio quarry.

Drag-Line Scrapers.

A drag-line scraper equipment used for stripping in a Kentucky sandstone quarry is described in Bulletin 124* of the Bureau of Mines. An interesting modification of the method was observed in a Pennsylvania quarry. One of the conditions usually considered necessary for successful operation of a drag-line scraper is a near-by place of disposal, preferably at a lower level than the area being stripped. At this quarry the stripped material had to be hauled in cars to the dumping ground, which was some distance away. A single scraper of ⅞-yard capacity, working on a drag line, stripped the soil back from the face. The loaded scraper was dragged up a plank incline onto a trap door in the platform at the upper end of the incline. The trap door dropped under the weight of the load and dumped the soil into a car on a track below. The incline and the platform should be shifted laterally as required. Two on the uneven surface.

men were employed to guide the scraper during loading, and part of the time of another man was required to control the cable and place the scraper in position. The entire operation of loading required only four men, and part of the time of a fifth. Except for the engine runner, the men were all unskilled laborers. The material was handled rapidly and the cost of loading was said to be about 3 cents a cubic yard. The loaded cars were hauled by cable to the dumping ground. The method seemed to be cheap and efficient.

In some quarries a scraper or bucket is lowered from the arm of a derrick and is loaded by hauling it toward the derrick with a horizontal cable wound on a drum. When full, it is hoisted, swung over a car by the derrick arm, and dumped. No figures have been obtained indicating the efficiency of the method.

Steam Shovel.

For removing large masses of material, a steam shovel is probably the most practical and efficient means. As the first cost of a steam shovel is high, to purchase one is unwise except where stripping is to be on a reasonably extensive scale. The nature of the rock surface also has a marked influence on the success of steam-shovel operations. In many limestone deposits the surface is eroded into deep channels and cavities which have been filled with soil. It is difficult, or impossible, to remove the material from such pockets with a steam shovel; also great difficulty

*Bowles, Oliver, Sandstone quarrying in the United States: Bull. 124, Bureau of Mines, 1917, pp. 29, 30.

may be encountered in laying tracks.

The usual method of stripping with a steam shovel is to load the material into side-dump cars and haul them with a locomotive in trains of 6 to 20 cars to a near-by dumping ground. Loading into dump wagons has been noted, but a large number are needed to keep the shovel working. The use of wagons may be justified for a limited period of time if it is desired that the stripped material should be placed where laying a track is not feasible.

Waiting for empty cars is one of the chief causes of poor steam-shovel efficiency. This may be due to lack of cars or locomotives, or to inadequate trackage facilities. At one quarry visited, in order to avoid unnecessary loss of time, a train of empties stood on a siding ready to be shifted into place as soon as the loaded cars were removed.

Where the stripping is thin, much time may be lost in frequent moving of the shovel. When a full train load can not be obtained from one position of the shovel, poor efficiency must result if locomotives and train crews are thus kept in idleness. Under such conditions, it may be wise to let the train crews work elsewhere while the steam shovel "casts over" a cut the entire length of the face. "Casting over" is a quarryman's term for making a cut with a steam shovel and depositing the material on the bank, thus forming a long ridge. When the next cut is made, a double amount of material is available from each position, and train crews are not kept idle while the shovel is being moved. Where the overburden is very thin, "casting over" may be repeated two or three times.

The cost of stripping with a steam shovel depends on the depth and nature of the materials to be removed, capacity of the shovel, condition of the rock surface, and facilities for removal of cars. Four cents a ton, actual working cost for loading only, is the minimum figure obtained. At one quarry having 1 to 10 feet of overburden, the total operating cost of stripping, including transportation, was 11 to 13 cents a ton. At an Illinois quarry having 20 to 30 feet of soil overburden, the operating cost of stripping, including transportation to a near-by dump, averaged 16 cents per cubic yard. Where the overburden is thin, the cost per ton will be relatively high, but the cost of stripping, per ton of rock obtained, will be relatively low.

A stripping conveyor operated in connection with a steam shovel by one Ohio company is noteworthy. The soil to be removed is 30 to 45 feet thick, and the bed of rock beneath is only 8 feet thick. With the low efficiency of stripping observed in some localities, profitable quarrying under such conditions would be almost impossible. As the rock is removed, the area worked out is available for disposal of overburden. The equipment, as shown in the cut, consists of an inclined bridgelike structure of steel mounted on wheels. On this incline, two independent cable cars on separate tracks are operated with an electric hoist. The cars are loaded with the steam shovel, hauled up the incline, and dumped. The total length of the conveyor is 175 feet, and it places the material 150 feet from the steam shovel. The shovel has a 2½-yard dipper, and each car is of 5-yard capacity. The company claims that stripping can be done by this method at an actual working cost of 2 cents a cubic yard, not including overhead charges, depreciation, or interest on the investment, and that with a gang of 9 men 2,000 yards can be handled per day. The equipment is well adapted for stripping back into pits from which all serviceable stone has been removed.

Road Legislation in Washington

Plan Proposed to Convert War Materials to Road Building—Several Bills Are Being Considered.

OF the bills of one kind or another before Congress, two of them have been introduced by Senator Bankhead of Alabama, two by Senator Swanson of Virginia, and one each by Senator Smoot of Utah and Representative Browne of Wisconsin and Shackleford of Missouri. However, one of the bills which Senator Swanson introduced and the one which Representative Brown introduced are precisely the same as the Bankhead bill, while the one introduced by Representative Shackleford provides for an additional $150,000,000 in any fiscal year for this work, in addition to the present appropriation. It is to be expended under the existing act.

It is felt that the identical bills introduced by Senators Bankhead and Swanson are the ones which the administration desires should be passed. All of the bills were introduced during the month of December, and one, a joint resolution which is equivalent to a bill, was introduced as late as the middle of the month. It is one of the two measures introduced by Senator Bankhead and it provides that the Secretary of War be directed to transfer to the Secretary of Agriculture all available war material not needed for the purpose of the War Department, but suitable for use in the improvement of highways, and that it be distributed among the highway departments of the several states upon the same basis of distribution as provided by the Federal aid road act. The purpose of this measure is to dispose of the vast amount of road building machinery which the United States sent to France and which was used during the war. There is also some road building machinery in this country owned by the Government which would be disposed of under this resolution, but Senator Bankhead's purpose is to dispose of the machinery sent overseas.

None of the bills now before Congress are looked upon as being a satisfactory solution of the problem. In fact, not one of them would dispose of the entire question as a majority of those interested in the subject would have it disposed of. For the most part, the bills only attempt to cover one angle, such as that of borrowing money with which to carry on the work and of distributing the funds.

A bill more comprehensive than any of those mentioned is being prepared by organizations highly interested in the subject along the lines laid down in the resolutions passed at the recent convention in Chicago. This bill, though still in very incomplete form, will provide for a Federal Highway Commission, placing the work of this immense project in the hands of such a commission rather than under the direction of the Office of Public Roads and Rural Engineering of the Department of Agriculture, of which the late Waller Logan Page was the head. That bill probably will be completed in the next month or six weeks, but it may not even be introduced at the present session if there seems to be practically no prospect of passage.

The bill now before Congress, which was first introduced by Senator Bankhead, and which made its appearance closely following a conference on the subject of road building between the senator and President Wilson, pro-

vides that the Government shall aid the states in the construction of rural post roads, and for the purpose of carrying out the act it is provided that the sum of $50,000,000 shall be immediately available; $75,000,000 shall be available July 1, 1919; $75,000,000 July 1, 1920, and $100,000,000 each July 1 up to and including that date in the year 1924.

The other bill introduced by Senator Swanson provides for road construction and improvement out of the funds derived from the operation of motor trucks engaged in carrying parcel post mail. The bill provides that the Postmaster General shall set aside at the close of each fiscal year 50 per cent of the net proceeds derived from the operation of these trucks and that the money shall be expended by the Secretary of Agriculture in keeping the postal roads in repair. The Secretary of Agriculture is authorized to make any co-operative arrangement with any state, county or municipal agency for carrying on this repair work.

The bill which appears to more nearly cover the subject is that introduced by Senator Smoot. It is entirely different from any of the others. It provides for the establishment of a United States Highway Commission, authorizes the Secretary of the Treasury to issue bonds to the amount of $1,000,000,000 and apportion the proceeds to the states according to population, land area, total assessed valuation of all taxable property, and the total mileage of all highways in each of the states. These funds, of course, are to be used in road construction. However, before any state can avail itself of the benefit of the funds it must establish a State Highway Commission having general supervision of road construction and improvement of that state. Provision is made for each state to reimburse the Treasury for its allotment of money on long-time payments.

Association Notes.

Road building was one of the principal topics for discussion at the annual meeting of the Portland Cement Association in New York, December 9, 10, 11 and 12.

W. R. Webster, secretary of the Iowa Sand and Gravel Producers' Association, died December 9 at his home in Mason City, Iowa. Mr. Webster was also a director of the National Association of Sand and Gravel Producers. His successor in the Iowa association has not yet been appointed.

A circumstance which cast a gloom over the recent road conference in Chicago was the death of Logan Walter Page of Washington, director of the U. S. Bureau of Public Roads. He died December 9 at the LaSalle Hotel, Chicago, from heart disease.

William M. Kinney has been appointed general manager of the Portland Cement Association. Mr. Kinney was for several years with the Universal Portland Cement Company at the Pittsburgh and Chicago offices, at the time of his appointment holding the position of inspecting engineer and engineer of promotion.

The Ohio State Macadam Association will hold its convention at Columbus on January 21 and 22.

The Ohio Sand and Gravel Producers' Association, as announced by the secretary-treasurer, E. S. Warner, Greeneville, Ohio, will hold a general meeting about the middle of January, at which officers for the new year will be elected.

The annual meeting of the National Slag Association will be held at the headquartrers of the association in the Leader-News building, Cleveland, Ohio, some time during the first half of January.

The annual meeting of the Lime Association will be held in Pittsburgh on February 12 and 13. Those who are expecting to attend as asked to advise Robert F. Hall, general manager, 503 Riggs building, Washington, D. C., so that satisfactory hotel reservations may be made for them.

A. P. Sandles, secretary of the National Crushed Stone Association, has been appointed by the United States Treasury Department as Ohio director in the Federal Farm Loan Bank at Louisville, Ohio.

Tons of Stone Per Pound of Explosive

The following data, covering the records of blasts made in different sections of the country, will give a general idea of what should be expected in blasting deep bore holes:

A blast in a limestone quarry in Tennessee, stone used for ballast and commercial purposes, consisted of sixteen 5⅝-inch bore holes, average depth 75 feet. Holes were spaced 18 feet apart, with average face burden of 22 feet. Three thousand seven hundred and fifty pounds of 60 per cent and 3,700 pounds of 40 per cent low freezing dynamite were used in the blast, producing 5.7 tons per pound of explosive.

A blast in cement rock in Pennsylvania consisted of fourteen 5⅝-inch bore holes, average depth 86 feet, spaced 18 feet apart, with a face burden of 30 feet. Four thousand eight hundred and fifty pounds of 60 per cent and 3,250 pounds of 40 per cent were used, producing 55,000 tons, or 6.8 tons per pound of explosive.

A blast in a Kentucky limestone quarry, stone used for ballast, consisted of nine bore holes, average depth 50 feet, spaced 18 feet apart and 25 feet back. Three thousand two hundred and fifty pounds of 40 per cent dynamite were used, producing 16,200 tons, or 5 tons to the pound of explosive.

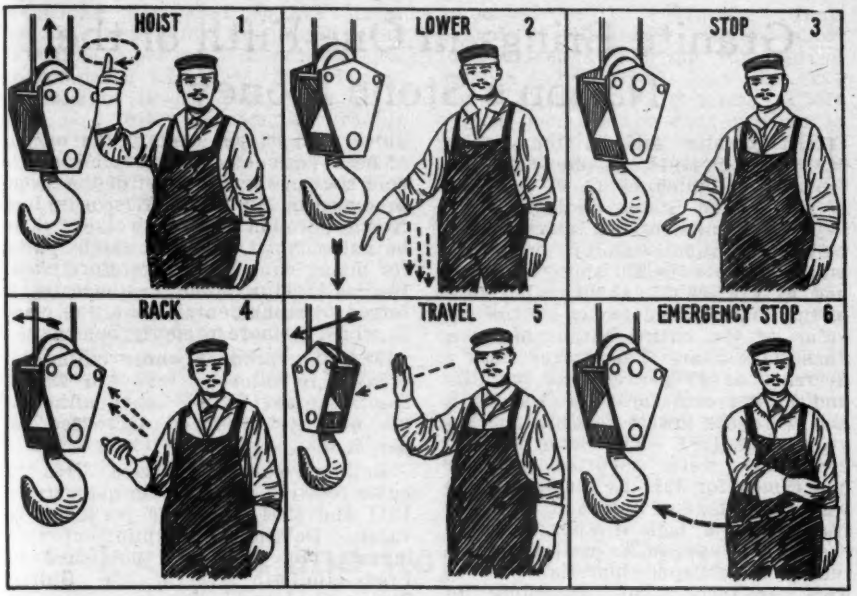
A blast made in an Oklahoma quarry, where stone was used for railroad ballast, consisted of eight bore holes 95 feet deep, average space between holes 28 feet, with average face burden 33 feet. Twenty-two hundred pounds of blasting gelatin, 3,350 pounds of 60 per cent and 1,250 pounds of 40 per cent dynamite were used, a total of 6,800 pounds, producing 62,000 tons, or 9 tons per pound of explosive. This blast was badly balanced, necessitating use of very strong explosive at bottom. The cost per ton was just as high or higher than a balanced blast.

A blast made in iron ore consisted of twenty-six 5⅝-inch bore holes of average depth of 84 feet. Spacing 15 by 15 feet. Holes were triple-loaded and fired with cordeau and one electric blasting cap. Eighty-five hundred pounds of 40 per cent dynamite were used, producing 50,000 tons of ore, or 5 tons per pound of explosive.

A blast made in cement rock in New Jersey consisted of 11 bore holes, average depth 102 feet. Spacing 20 by 22 feet. Two thousand and forty pounds of 60 per cent gelatin and 4,475 pounds of 40 per cent gelatin were used, producing about 40,000 tons of stone, or 6 tons per pound of explosive.

A blast made in a West Virginia quarry, stone used for ballast, consisted of seven bore holes, average depth 60 feet. Spacing 18 by 20 feet. Sixteen hundred pounds of 50 per cent gelatin and 1,200 pounds of 33 per cent extra dynamite were used, producing 13,000 tons of stone, or 4.6 tons per pound of explosive.

NOW comes the seasons of conventions. Up to the time of the signing of the armistice it was thought that conventions would get but scant attention this season. But the crisis is happily past and we are at the real business of life again. So right now, more than ever, can the convention prove its usefulness. These will be no mere perfunctory gatherings this year, but will be groups of earnest men who are determined to find out how best to reopen the ordinary channels of business. It will be well worth while to be on hand at these meetings.



SIGNALS FOR GUIDING THE CRANE

THE next Liberty Loan will "go over" with a rush if the wheels of the ordinary industries of the country are turning steadily and consistently. And they will be! A large amount of highway construction and other large public and private work will be under way by that time. And the pit and quarry men of the country will be right up in the front rank of those who put the thing over.

IT DID not seem to be quite possible to put over the joint convention of the gravel and stone men this year. But they came so near it that there should be no trouble in bringing it about in 1920.

Mr. W. H. Bennett has been recently appointed manager of the pump department of the American Manganese Steel Company, Chicago. Mr. Bennett has been connected with this concern for a number of years, and has had a wide experience in conjunction with pump installations.

Standard Crane Signals.

The Safety Engineering Section of the U. S. Shipping Board Emergency Fleet Corporation has adopted standard crane signals as a means of communication between the floormen and cranemen in the handling of materials by overhead traveling cranes.

These signals are illustrated by the accompanying cuts and described as follows:

1. Hoist—Forearm vertical. Make small horizontal circle with the hand.
2. Lower—Arm extended, hand below hip, wave forearm downward.
3. Stop—Arm extended, hand level with the hip. Hold position rigidly.
4. Rack—Arm extended, hand just above hip, fingers closed, thumb extended horizontally, jerk hand in direction of racking.
5. Travel—Forearm vertical, hand open. Wave forearm in direction of travel.
6. Emergency Stop—Arm extended, hand level with the hip. Move hand quickly to right and left.

Crane operators are also instructed to observe signals only from persons duly authorized for crane service, and under no circumstances to move a load until the signal is received from the proper man.

Granite Brings in One-Fifth of the Nation's Stone Money

THE granite sold in the United States in 1917, as shown by figures compiled by G. F. Loughlin of the United States Geological Survey, Department of the Interior, from reports submitted by producers, amounted to 5,564,200 short tons, valued at $15,544,957, about 7 per cent of the quantity and 19 per cent of the value of the entire output of stone during the year. The figures show a decrease of 40 per cent in quantity and 11 per cent in value from 1916, and were the lowest recorded in any year since 1901. The same adverse conditions were reported by the quarrymen for 1917 as for 1916—high wages, shortage of cars and boats for transportation, lack of labor, and high cost of all supplies, as well as substitution of cheaper material. Prices were advanced, but, according to many producers, not enough to cover the increased cost of production.

This is the first year for which complete figures showing the quantity of granite produced have been recorded, and in order to compare the production with that of 1916 the output in that year has now been determined largely from actual reports and partly from estimates. The quantities are given according to the usual unit of measurement, but in order to get the total the units have been reduced to short tons.

The following states are the principal producers of monumental granite. In 1917 their output represented 86 per cent of the quantity and 90 per cent of the value of monumental granite.

Monumental Granite Produced in Certain States in 1917.

State.	Quantity (cubic feet).	Value.
Vermont	1,620,464	$2,200,509
Minnesota	264,194	803,370
Wisconsin	115,255	538,370
Massachusetts	366,738	480,568
North Carolina	190,737	393,021
New Hampshire	156,378	252,522
Rhode Island	105,323	158,702
Connecticut	55,199	114,786
Colorado	44,030	104,241

The price per cubic foot, as shown above, differs greatly, depending on the form in which the stone is sold as well as on the grade of the stone. More than 90 per cent of the output of both Vermont and Massachusetts is sold rough, whereas most of the stone produced in Minnesota, Wisconsin and North Carolina is sold dressed. The output of North Carolina, chiefly stone for mausoleum work, heretofore classified as building stone, has been transferred to monumental stone, the class in which it more properly belongs.

The only product whose output increased in value in 1917 was monumental stone (7.8 per cent), although the quantity produced decreased 6.6 per cent.

Building stone decreased 3,462,721 cubic feet (49 per cent) in quantity in 1917 and $803,129, or 20 per cent, in value. Detailed description of this industry for 1917 was published in Press Bulletin 379 of the United States Geological Survey.

Granite paving blocks decreased 12 per cent in quantity in 1917 and 0.5 per cent in value, the average price per thousand being $57.67, an increase of $6.94 over 1916. A production of 19,004 tons of "Durax" blocks, valued at $115,717, was also reported. A detailed report on this industry has been published by the United States Geological Survey.

Granite used for rubble decreased 85,288 short tons (34 per cent) in quantity and $54,363 (21 per cent) in value, and granite for riprap 1,188,458 short tons (54 per cent) in quantity and $409,379 (40 per cent) in value. This class of stone varies greatly in production from year to year, depending on the amount of river and harbor work done by the state and Federal governments. In 1916 California, Connecticut, Delaware, North Carolina and Virginia were the states showing greatest production for this purpose. In 1917 California decreased over 50 per cent, North Carolina about 30 per cent, and Virginia and Connecticut reported practically no output of rubble; Massachusetts showed a greatly increased production, and Arizona, Delaware, New York and Texas were important producers, although operations were confined to not more than two localities in each state.

Curbing decreased 600,817 linear feet (30 per cent) in quantity and $129,317 (15 per cent) in value in 1917 as compared with 1916, following an increase of 19 per cent in value in 1916 over 1915. Georgia, the leading state in 1916, decreased in value $110,427 (49 per cent), and ranked third in 1917, being exceeded by Massachusetts, which showed an increase of $7,194 (4 per cent), and North Carolina, which showed an increase of $35,818 (28 per cent).

Crushed granite represented 17 per cent of the value of the total granite output in 1917, and 20 per cent in 1916. There was a decrease of 1,658,279 short tons (35 per cent) in quantity and $842,796 (23 per cent) in value in 1917. According to uses, the crushed granite sold for road metal amounted to 1,176,557 short tons, valued at $1,001,076; 478,667 short tons, valued at $269,218, for railroad ballast, and 1,409,902 short tons, valued at $1,430,326, for concrete. There was a decrease for each product in 1917 in both quantity and value, but railroad ballast showed the greatest decrease, 59 per cent in quantity and 54 per cent in value. All the states that reported production for this purpose in 1917 decreased in output except Virginia. The total average value of crushed granite in 1917 was 88 cents a ton, which was 13 cents more than in 1916.

The number of operators decreased from 598 to 483 in 1917, and several of those that operated reported their quarries closed during part of the working year.

Exports and Imports of Stone

IN SPITE of generally unfavorable building markets and of difficulties in shipping, the value of stone exported from the United States in 1917 was $1,680,282, which was 13 per cent more than in 1916. The value of the unmanufactured stone exported increased 42 per cent and that of the manufactured store about 3 per cent. About 68 per cent of the total value of the exports in 1917 represented stone shipped to countries in North America, an increase of 35 per cent over 1916. Canada, as usual, took the greater part of the exports (81 per cent, valued at $929,434), which represented an increase over 1916 in both manufactured and unmanufactured stone. Cuba ranked second, with $72,810, but its imports decreased 13 per cent; Mexico stood third, with $58,880, an increase of 366 per cent; and Panama stood fourth, with $33,037, an increase of 56 per cent.

The exports of stone to Europe, which represented 25 per cent of the total value of the exports of stone in 1916, represented only 14 per cent of the total value in 1917. They fell from $371,723 to $230,109, a decrease of 38 per cent. Great Britain, with $169,679, and Italy, with $93,843, our best customers in 1916, took considerably less stone in 1917—34 per cent and 86 per cent less, respectively. The value of the stone exported to France ($46,770) increased 34 per cent. The value of that exported to South America ($146,271) increased 51 per cent. Argentina, Brazil and Chile were our best customers in South America. The exports to Asia, valued at $93,981, decreased 15 per cent. Nearly one-half of this value represents stone shipped to the Dutch East Indies, and about one-fourth represents stone shipped to the British East Indies. The value of the stone exported to Oceania and Africa showed an increase.

The stone imported for consumption in the United States in 1917 was valued at $681,475, which was $277,922, or 29 per cent less than in 1916. The imports of marble, including the usual small imports of "onyx marble" amounted to $581,422, or 85 per cent of the total stone imported for consumption, a decrease of $141,989, or 20 per cent, compared with 1916.

More than 90 per cent of marble imported came from Italy. England and France, the countries furnishing the next largest imports, together sent less than 8 per cent. Mexico, which ranked next to Italy in 1915 and 1916 and annually sent general imports of marble averaging in value about $34,000, furnish general imports valued at only $3,257 in 1917. Mexico supplied mainly or wholly "onyx marble."

Dressed Building Marble Showed Increased Production in 1917

THE value of marble sold in the United States in 1917, according to reports made by the producers to G. F. Loughlin, United States Geological Survey, Department of the Interior, was $6,330,387, a decrease of 10 per cent ($702,784) from the value in 1916 and the lowest annual value for our marble output since 1904. The quantity produced in 1917 was about 3,627,750 cubic feet (310,130 tons), as against about 4,795,000 cubic feet (409,970 tons) in 1916—a decrease of 24 per cent. The quantity produced in 1917 included a small proportion of serpentine, as shown in a later paragraph, but no "onyx marble."

Of the marble sold in 1917, 2,156,351 cubic feet (about 184,370 tons), valued at $6,100,280, was building and monumental marble—a decrease of 33 per cent in quantity and 11 per cent in value compared with 1916. The average price of this stone per cubic foot was $2.83 in 1917 and $2.13 in 1916.

The marble sold for use as flux, terrazzo and mosaic work, and ornamental stone, and the pulverized marble sold for use in agriculture and in manufactures amounted to 125,764 tons, valued at $230,107. The marble sold for these purposes in 1916 amounted to 136,217 short tons, valued at $209,155.

The total value of marble sold in 1917 for use as building stone ($3,702,563) was 22 per cent less than that sold in 1916, and the total quantity (1,470,793 cubic feet) was 35 per cent less. Exterior building stone, which represented 36 per cent of the total quantity of building stone, decreased 37 per cent in quantity and 25 per cent in value; stone for interior work, which represented 64 per cent of the total quantity, decreased 34 per cent in quantity and 20 per cent in value. Marble sold dressed for use in the exterior of buildings was the only building stone product that showed increase in quantity (13,549 cubic feet) in 1917; but the value of this product decreased $38,328 (4.7 per cent). The general average price of marble sold as building stone (rough and dressed) in 1917 was $2.52 per cubic foot; the average value of exterior stone was $2.05 and of interior stone $2.77. Vermont and Tennessee produced over 56 per cent of the quantity of marble quarried for use as building stone, each state reporting over 390,000 cubic feet. Vermont's output was nearly equally divided between interior and exterior stone, whereas 97 per cent of Tennessee's product was interior building stone. About 37 per cent of the Vermont and over 50 per cent of the Tennessee marble was sold as rough stone. Georgia and Missouri were the next largest producers of building marble, the quantity produced in each state exceeding 100,000 cubic feet.

The value of the marble produced for monumental use in 1917, including rough and dressed stone, increased $318,307 (15 per cent) over that in 1916. The quantity, however, decreased 255,230 cubic feet (27 per cent). The average price per cubic foot was $3.50 in 1917, which was $1.29 more than in 1916. There was a large increase in the quantity of dressed monumental stone sold in 1917—107,403 cubic feet (54 per cent), but a decrease of 362,926 cubic feet (49 per cent) in the quantity of rough stone. Vermont produced more than 55 per cent (377,418 cubic feet), and Georgia more than 25 per cent of the country's output of monumental marble. Missouri, New York and Tennesse rank next in this product.

Marble for mounmental and "other uses" declined in quantity but increased in value in 1917, as it did in 1916. Marble for "other uses" includes rough stone sold to lime burners, to carbonic acid factories, to pulp mills, and to blast furnaces; crushed stone for road metal and terrazzo; small cubes for mosaics; and finished stone for electrical apparatus and ornamental purposes. The stone sold for flux to blast furnaces amounted to 21,194 long tons, valued at $24,899, and for terrazzo to 17,551 short tons, valued at $51,218. In 1916 the stone sold for terrazzo was 24,340 short tons, valued at $83,466.

Limestone Output Increases in Value

THE value of the limstone produced in the United States in 1917 increased $4,953,780 (12 per cent), but the quantity decreased about 3,770,000 short tons (6 per cent). The total output for 1917, as compiled from reports made by the producers to G. F. Loughlin, United States Geological Survey, Department of the Interior, was 63,465,000 short tons, valued at $46,263,379, and represented 76 per cent of the quantity and 56 per cent of the value of all stone quarried in the United States. The average price was 73 cents a short ton in 1917, which was 11 cents more than in 1916.

The production of limestone for use in the manufacturing industries was greater both in quantity and in value in 1917, but the increase in quantity for this use was not sufficient to offset the large decrease in building, riprap and crushed stone, although the increase in the price of all products brought the total value up to an amount greater than that in 1916. The number of active operators in 1917 was 1,465, which was 218 less than in 1916. Many small quarries that supply local markets were entirely closed during 1917, owing to lack of demand, scarcity of labor and high wages, as well as increased cost of supplies and substitution of cheaper material.

Forty-four states produced limestone in 1917, two more than in 1916. In 1916 Hawaii reported pulverized limestone sold for agriculture but none in 1917. In 1917 Maine, which reported no output in 1916, reported a small quantity of stone sold to paper mills. Mississippi for the first time reported a small output of limestone, which was pulverized stone for use in agriculture and was crushed at the State Penitentiary at Waynesboro, Wayne County, and at Okolona, Chickasaw County. Nevada for the first time reported stone shipped for furnace flux, sugar manufacture, and other minor uses, from Sloan, Clark County, and from Ludwig and Mason, Lyon County. Of the total producing states 33 increased in value of output. Washington, Rhode Island, Oregon, South Dakota, Wyoming, Massachusetts, and New Mexico, which rank among the states that produce smaller quantities of limestone, showed gains of 100 to 508 per cent. The increase in Washington and Rhode Island was in stone for fluxing; in Wyoming, South Dakota, and Oregon in stone for sugar factories; in New Mexico for crushed stone, and in Massachusetts in ground limestone for agriculture. The other states that reported increase in output showed gains ranging from 1 per cent in Ohio to 88 per cent in Georgia. The most conspicuous gain was in Pennsylvania, $2,421,885 (30 per cent). This follows a gain in 1916 of over $1,800,000 and in 1915 of more than $1,000,000. Michigan increased more than $370,000 in 1915, more than $500,000 in 1916, and $931,132 (38 per cent) in 1917. Many of the states showed record values in 1917, and 12 states had outputs valued in excess of $1,000,000, one more (Alabama) than in 1916. The decreased output shown by 11 states ranged from less than 1 per cent in Tennessee and 1 per cent in Missouri to 22 per cent in Kentucky and 33 per cent in Vermont. States whose product was valued in excess of $2,000,000 were (named in order of rank)—Pennsylvania, Ohio, Indiana, New York, Michigan and Illinois. In 1916 Illinois followed Indiana. Pennsylvania, New York, Michigan and Ohio showed gains respectively of 30 per cent, 16 per cent, 39 per cent and 1 per cent; Illinois decreased 2 per cent and Indiana 4 per cent. Pennsylvania's value in 1917 was nearly 23 per cent of the total as against 20 per cent in 1916, 18 per cent in 1915, and 16 per cent in 1914. Over four-fifths of the value of Pennsylvania's output was for furnace flux and the greater part of the remaining value was for crushed stone.

The output of crushed limestone in 1917 showed a decrease of 17 per cent (5,537,394 short tons) in quantity and less than 1 per cent ($174,336) in value from that of 1916. The average price per ton was 66 cents, which was 11 cents more than in 1916. Of the total decrease nearly 72 per cent ($3,972,352 short tons) was in crushed stone for roadmaking, a little over 1 per cent (56,274 short tons) in concrete, and about 27 per cent (1,508,768 short tons) in railroad ballast.

Four States Furnished Most Trap Rock

THE well-known group of road-building rocks which includes basalt, diabase, and some other dark igneous rocks that are very similar in mineral composition and physical properties furnished 9 per cent of the value of all the stone produced in the United States in 1917, according to statistics compiled under the direction of G. F. Loughlin, of the United States Geological Survey, Department of the Interior.

The total value of the basalt produced in 1917 was $7,570,885, which is $95,412 or 1.2 per cent less than that in 1916, and the value in 1916 declined 10 per cent ($822,925) from that in 1915. The quantity of this stone produced decreased from 10,233,640 short tons in 1916 to 8,852,640 short tons in 1917, a decrease of 14 per cent. Most of the stone of this class now quarried is crushed for use as road metal and in concrete, and in small part for railroad ballast. In 1917 this crushed stone represented 91 per cent of the quantity and 87 per cent of the value of the basalt and related rocks sold in the United States, and 20 per cent of the quantity and 22 per cent of the value of the total crushed stone sold.

The sales of the 8,067,582 short tons of crushed stone valued at $6,600,957, classified according to use, were divided as follows: Road metal, 3,751,396 short tons, valued at $3,124,088; concrete 3,296,711 short tons, valued at $2,654,410; railroad ballast 1,019,475 short tons, valued at $822,459. There was a decrease of 940,792 short tons (10 per cent) in total quantity, but a small increase, $61,949 (1 per cent), in the total value of crushed basalt and related rocks in 1917. The average price per ton in 1917 was 82 cents, 9 cents more than in 1916. Road metal showed the largest decrease in quantity, 516,604 tons (12 per cent). The quantity of concrete decreased 341,705 short tons (9 per cent). The value of road metal, however, decreased $68,536 (2 per cent), and that of concrete increased $69,346 (3 per cent). Railroad ballast decreased in quantity 82,483 short tons (7 per cent) and increased in value $61,139 (8 per cent).

The principal states producing this kind of crushed stone, named in order according to rank of value of output, are New Jersey (road metal and concrete); Pennsylvania (road metal and railroad ballast); Connecticut (road metal and concrete); California (concrete). Each of these states produced over 1,000,000 short tons, valued at more than $900,000. New Jersey, Pennsylvania and California each decreased in quantity and increased in value of output during 1917; Connecticut showed increase in both quantity and value. In 1916 New York was included in this group, ranking third, but a large decrease in both quantity and value in 1917 reduced this state to fifth in rank. Continued decrease may be expected from New York as the Palisades Park Commission has taken over all the principal quarries, and is gradually closing them.

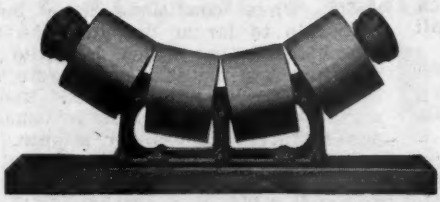
A considerable quantity of stone of this class is used in rubble and riprap work, including jetties and breakwaters. In 1917 the quantity sold for these uses was 641,619 short tons, valued at $835,177; in 1916, 1,097,000 short tons, valued at $982,539, a decrease of more than 40 per cent in quantity and of 15 per cent in value. The decrease was due entirely to diminished production in the State of Washington, where the decrease in output in 1917 followed a large decrease in 1916.

The basalt and related rock sold as building stone consists almost entirely of rough stone used for foundation work. The product increased in quantity and decreased in value in 1917, the output being 912,447 cubic feet, valued at $39,200, as against 853,000 cubic feet, valued at $64,277 in 1916.

Minimum Carload Weight on Lime.

The Lime Association filed a protest with H. M. Pearce, chairman St. Paul District Freight Traffic Committee, 275 East 4th street, St. Paul, Minn., against Docket No. 14, which proposed to increase the minimum carload rate on lime from 25,000 to 50,000 pounds in that district. Under date of December 24, Supplement No. 1 to Docket 14 was issued withdrawing the proposal, but announcing that it would be redocketed at a later date.

CALDWELL CONVEYORS



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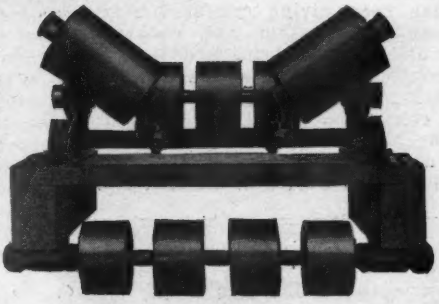

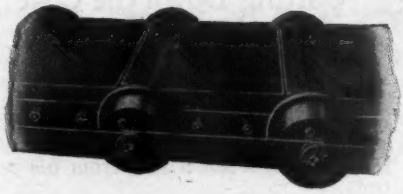

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Extreme light weight and traveling ability are combined with real digging ability in the Type A ½-yard Erie shovel, which has just been placed upon the market by the Ball Engine Co., Erie, Pa.

The A Erie weighs only thirteen tons—yet it is a real steam shovel, and works steadily in hard materials with practically no repair expense.

The manufacture of A Eries has just been placed upon a production basis, but this is not a new machine. It has been giving excellent service in sand and gravel pits, excavating clay and shale for brickyards, and also on contracting work such as cellar excavating, trench digging, road grading, etc.

The photo shows one A Erie which has done excellent work for P. Cogger, producer and dealer in crushed stone,

sand and gravel, Lowell, Mass. Mr. Cogger writes: "We are handling 300 yards of gravel per day, and the A Erie is having an easy time. It has given me perfect satisfaction, and has done 50 per cent more work than I expected."

This shovel is light enough to move around easily in the pit, and climbs grades as steep as 25 per cent. It has two traveling speeds—1 to 2 miles per hour on "low," and 2 to 3 miles per hour on "high." It is steered by power, using the same power steering arm which has been such a success on 600 Type B Eries which are in service.

The A Erie is equipped with a dipper of ½-yard capacity. Two dippers fill a 1½-yard wagon or car; four dippers fill a 2-yard car. The entire machine is designed and built to operate this dipper in hard materials without undue strain on any part.

The "A" is rated to excavate 30 to 40 yards per hour. This rated capacity has been exceeded over and over again, when conditions have been favorable to larger output. The attainable working speed is three to six dippers of material per minute, although the average speed under actual working conditions is usually one to three dippers per minute.

The A Erie makes a cut 28 feet 4 inches wide on floor level, or 46 feet 4 inches wide at 8 feet above floor level. The width of cut and height of dump, as given, are based upon the boom being set at the usual angle of 47½ degrees from the horizontal. The height of dump can be increased beyond 13 feet, as high as 16 feet 5 inches, by raising the boom. Likewise, the width of cut can be increased by lowering the boom. It is a simple matter to raise or lower the boom, as the outfit is equipped with a boom hoist.

Cutting Down the Cost of Loading.

Mr. Hugh Graham, road commissioner, Verona township, Bad Axe, Mich., has installed a Galion Imperial screening plant during the past summer. In response to an inquiry, Mr. Graham gave some data from his records.

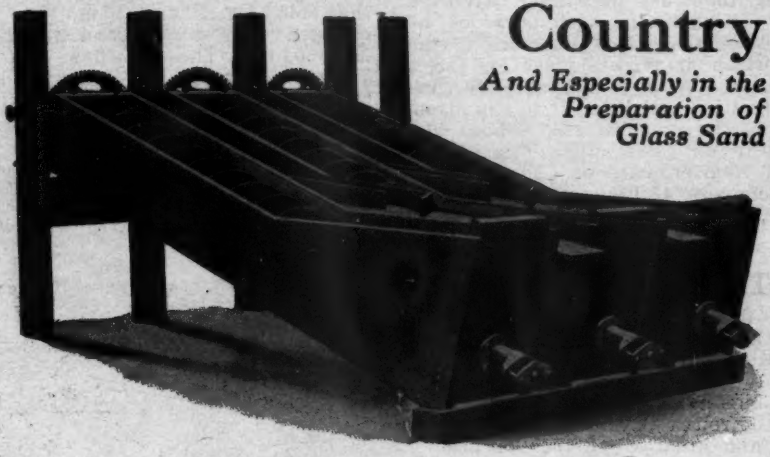
He says that the material delivered on the road tests 75 per cent pebbles. The pit itself runs on an average of 50 per cent sand and 50 per cent gravel, although in several places the percentage of sand was greater and in no case was the percentage of gravel greater. It was costing him about 30 cents per yard to screen the material and put it on the wagons. This 30 cents includes the cost of stripping.

The plant was set up on June 26th and started about 3 p. m. For the balance of that day its output was 30 yards. For the several days following, these figures are taken from Mr. Graham's records:

June 27	145 yards
June 28	198 yards
June 29	191 yards
July 2	220 yards
July 3	175 yards
July 4	185 yards
July 5	184 yards
July 8	237 yards
July 9	196 yards

Used in Some of the Largest Quarries in the Country

And Especially in the Preparation of Glass Sand



LEWISTOWN
Sand Washers

These are reasonably priced, well built, compact outfits, which can be easily and quickly installed. They are simple in construction and efficient in operation. Extensively used in the manufacture of glass sand which is so much needed today in the making of optical lenses for field glasses, telescopes, etc., required by the Government.

If you are not acquainted with Lewistown equipment and service, it will pay you to look into it.

We are in position to assist you solve your problem of whatever nature, if it pertains to crushing, grinding, screening, washing, drying and conveying, as we manufacture a full line of this machinery and equipment. Drop us a line stating what you desire information on.

Lewistown Fdy. & Machine Co.

LEWISTOWN, PENN.

American Materials in France.

Mr. Paul Negrier, an engineer attached to the French High Commission, suggests the possibility of extending the knowledge of American building materials and thereby developing their use in France. With a view to furthering such purposes, he will be glad to receive from the American firms catalogues and price lists. His purpose is to classify such information and bring it to the attention of the French trade. Those who care to do so, send such matter to Paul Negrier, care of Charles Blanc & Company, 42 Boulevard Richard Le Noir, Paris.

The Amsco Pump.

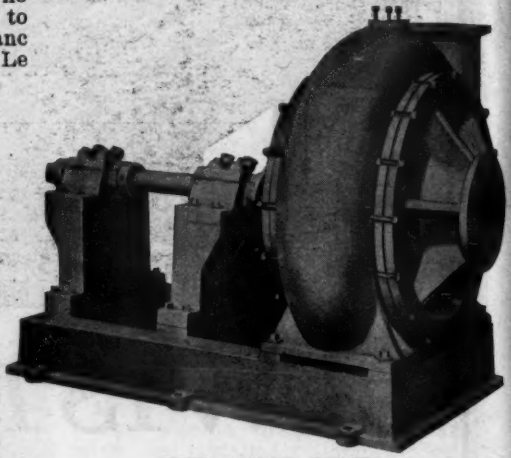
In designing the Amsco Pump the aim of the American Manganese Steel Company's engineers was to design a pump possessing the highest efficiency, minimum cost of repair parts and repair labor, and greatest number of productive operating hours.

With this in mind, they visited numerous plants of sand and gravel producers using centrifugal pumps, talked with the men actually doing the pumping, secured data on pumps operating under various conditions and difficulties, and obtained information and suggestions from them that would eliminate the troubles experienced. All this valuable data was used to advantage in the design of the Amsco sand and gravel pump.

The Amsco pump shell has no stud bolts. The two side plates have slotted flanges in the shell. Into these slots, bolts are dropped. Every operator will appreciate this feature. This means no more stud bolts are broken or studs worn off by the abrasion of the sand. The side plates are quickly removed. The gaskets between side plates and shell are solid rings, no holes being punched into them to fit over the stud bolts.

The suction side plate projects into the opening of the runner. No sand or gravel can drop between runner and side plate. The opening between runner vanes is large, thus permitting all solids to enter and pass through easily. The hub of runner does not project inside of the runner, but is on the far side, offering no resistance to the flow of material.

The packing gland is located close to the runner and is protected from sand by close fitting of the side plate around the shaft, and a water seal. The thrust is taken care of by thrust collars in the main bearing and a ball-bearing thrust collar. By reversing the side plates the pump can be changed from a left-hand to right-hand pump. The only new part required is a runner for right- or left-hand operation as the case may demand.



THE AMSCO PUMP

Trade Notes.

The January Bulletin of the Walter A. Zelnicker Supply Co., St. Louis, lists an unusually complete line of used equipment, which will be of interest to sand and gravel operators and quarry men. There are a large number of locomotives of various types, also dump carts, trucks of a wide variety, and smaller pieces of equipment, which will be found useful to the men who read PIT AND QUARRY.

One of the house organs which never fails to get attention is Driver Dan, the "Sterling Man," published by the Sterling Motor Truck Company. In addition to the information about motor trucks, it has a large amount of matter of interest and cheer to anyone who receives it. The December issue states that if you are not on the mailing list, send your address to Driver Dan, Editor, Artist and Friend, care of Sterling Motor Truck Co., Milwaukee, Wis.